

(FILE 'USPAT' ENTERED AT 11:29:14 ON 15 AUG 1999)

L1	1787 S 430/270.1/CCLS
L2	355 S L1 AND (SULFONIUM)
L3	79 S L2 AND (PGA OR (PHOTOACID GENERATOR#))
L4	5 S L3 AND (PROPYLENE GLYCOL METHYL ETHER ACETATE)
L5	65 S L3 AND GLYCOL
L6	64 S L5 AND ETHER
L7	16 S L3 AND (GLYCOL ETHER)
L8	7 S L7 AND SULFONATE
L9	3 S L4 AND SULFONATE
L10	39 S L6 AND SULFONATE
L11	6203 S (SULFONIUM)
L12	1152 S L11 AND (PHOTORESIST OR PHOTSENSITIVE)
L13	147 S L12 AND (PHOTOACID OR PGA)
L14	9 S L13 AND (PROPYLENE GLYCOL METHYL ETHER ACETATE)
L15	6 S L14 AND SULFONATE
L16	157 S L1 AND (PGA OR PHOTOACID)
L17	1 S L16 AND (PROPYLENE GLYCOL METHYL ETHER ACTETATE)
L18	97 S L2 AND (PGA OR PHOTOACID)
L19	0 S L18 AND (PROPYLENE GLYCOL METHYL ETHER ACTETATE)

L4

- \* 1. 5,919,597, Jul. 6, 1999, Methods for preparing photoresist compositions; Roger F. Sinta, et al., 430/270.1, 905 [IMAGE AVAILABLE]
- \* 2. 5,712,078, Jan. 27, 1998, High contrast photoresists comprising acid sensitive crosslinked polymeric resins; Wu-Song Huang, et al., 430/270.1, 326, 905; 522/78 [IMAGE AVAILABLE]
3. 5,322,765, Jun. 21, 1994, Dry developable photoresist compositions and method for use thereof; Nicholas J. Clecak, et al., 430/326, 270.1, 313 [IMAGE AVAILABLE]
- \* 4. 5,296,332, Mar. 22, 1994, Crosslinkable aqueous developable photoresist compositions and method for use thereof; Harbans S. Sachdev, et al., 430/270.1, 272.1, 280.1, 312, 315 [IMAGE AVAILABLE]
5. 5,250,395, Oct. 5, 1993, Process for imaging of photoresist including treatment of the photoresist with an organometallic compound; Robert D. Allen, et al., 430/325; 216/66; 430/270.1, 313, 330 [IMAGE AVAILABLE]

\* Sulfonate

1. 5,919,597, Jul. 6, 1999, Methods for preparing **photoresist** compositions; Roger F. Sinta, et al., 430/270.1, 905 [IMAGE AVAILABLE]
2. 5,712,078, Jan. 27, 1998, High contrast photoresists comprising acid sensitive crosslinked polymeric resins; Wu-Song Huang, et al., 430/270.1, 326, 905; 522/78 [IMAGE AVAILABLE]
3. 5,397,685, Mar. 14, 1995, Light-sensitive composition and process; George R. E. Daniels, et al., 430/325, 280.1, 311, 315, 324, 327, 330, 935 [IMAGE AVAILABLE]
4. 5,312,715, May 17, 1994, Light-sensitive composition and process; George R. E. Daniels, et al., 430/280.1, 311, 315, 324, 327, 330, 935 [IMAGE AVAILABLE]
5. 5,296,332, Mar. 22, 1994, Crosslinkable aqueous developable **photoresist** compositions and method for use thereof; Harbans S. Sachdev, et al., 430/270.1, 272.1, 280.1, 312, 315 [IMAGE AVAILABLE]
6. 5,164,278, Nov. 17, 1992, Speed enhancers for acid sensitized resists; William R. Brunsvold, et al., 430/176, 270.1, 914, 918; 522/15, 25, 31, 32 [IMAGE AVAILABLE]

1, 2, 3, 5, 6, 7, 8, 20<sub>1</sub>, 21, 24, 31  
17? 18? 19?

US PAT NO: 5,322,765 [IMAGE AVAILABLE]  
US-CL-CURRENT: 430/326, 270.1, 313

L4: 3 of 5

DRAWING DESC:

DRWD(30)

Suitable **photoacid generators** for use in the present invention include radiation degradable acid generators (sometimes known as photoacids). These photoacids include metallic and . . . triarylsulfonium salts. These photoacids may include diphenyliodonium hexafluoroarsenate, di(t-butylphenyl)iodonium hexafluoroarsenate, diphenyliodonium hexafluoroantimonate, di(t-butylphenyl)iodonium hexafluoroantimonate, diphenyliodonium triflate, di(t-butylphenyl)iodonium triflate, triphenylsulfonium hexafluoroantimonate, tri(t-butylphenyl)**sulfonium** hexafluoroantimonate, triphenylsulfonium hexafluoroarsinate, tri(t-butyl-phenyl)sulfonium hexafluoroarsenate, triphenylsulfonium hexafluorophosphate, tri(t-butylphenyl)**sulfonium** hexafluorophosphate, triphenylsulfonium triflate and tri(t-butylphenyl)**sulfonium** triflate.

DETDESC:

DETD(12)

This . . . into a photoresist formulation such that there was 14.40% (w/w) poly(p-hydroxystyrene), 1.00% (wt/wt) 2,6-diacetoxymethyl-p-cresol, 1.15% (w/w) 9- anthracenemethanol, 81.99% (w/w) **propylene glycol methyl ether acetate** and 1.44% (w/w) MDT (trifluoromethylsulfonyloxy-bicyclo[2.2.1]-hept-5-ene-2,3-dicarboximide), the non-metallic sulfonic acid precursor of U.S. patent application Ser. No. 07/322,848 filed Mar. 14, . . .

CLAIMS:

CLMS(19)

19. . . . claim 18 wherein the trialkylsulfonium hexafluoroantimonates, hexafluoroarsenates, hexafluorophosphates, and triflates are selected from the group consisting of triphenylsulfonium hexafluoroantimonate, tri(t-butylphenyl) **sulfonium** hexafluoroantimonate, triphenylsulfonium hexafluoroarsenate, tri(t-butylphenyl)**sulfonium** hexafluoroarsenate, triphenylsulfonium hexafluorophosphate, tri(t-butylphenyl)**sulfonium** hexafluorophosphate, triphenylsulfonium triflate, and tri(t-butyl-phenyl)**sulfonium** triflate.

1-3, 4, 5, 17 18, 19 20, - 24, 31  
7  
1

US PAT NO: 5,397,685 [IMAGE AVAILABLE]

L15: 3 of 6

SUMMARY:

BSUM(5)

Aqueous . . . containing at least two epoxy or vinyl ether groups, generally an epoxy resin, and a photoactive component such as a **sulfonium** salt or an azide compound capable of initiating crosslinking of the epoxy or vinyl ether compound upon exposure to activating. . .

DETDESC:

DETD(3)

The . . . are preferred. They are made following procedures known in the art and disclosed in numerous publications such as by DeForest, **Photoresist** Materials and Processes, McGraw-Hill Book Company, New York, Ch. 2, 1975 and by Moreau, Semiconductor Lithography Principles, Practices and Materials, . . .

DETDESC:

DETD(8)

Useful . . . active hydrogen atom reactive with an oxirane ring at room temperature. Illustrative of suitable substituents include halogens, ester groups, ethers, **sulfonate** groups, siloxane groups, nitro groups, phosphate groups, etc. Exemplary epoxy-containing materials include glycidyl ethers such as the glycidyl ethers of. . .

DETDESC:

DETD(12)

As stated above, preferred photoactive components of the invention are **photoacid** generators. **Photoacid** generators useful in the compositions of the invention are known in the art and extensively described in the literature such. . .

DETDESC:

DETD(14)

Preferred onium photoactive compounds are aromatic iodonium complex salts and aromatic **sulfonium** complex salts. These materials are fully disclosed in the above noted published EPO application No. 0,255,989.

DETDESC:

DETD(15)

Examples . . . diphenyliodonium tetrafluoroborate, diphenyliodonium

hexafluorophosphate, phenyl-2-thienyliodonium hexafluorophosphate, diphenyliodonium hexafluoroantimonate, di(2,4-dichlorophenyl)iodonium hexafluorophosphate, di(4-methoxyphenyl)iodonium hexafluorophosphate and di(3-methoxycarbonylphenyl)iodonium hexafluorophosphate, di(4-acetamidophenyl)iodonium hexafluorophosphate. Examples of aromatic **sulfonium** compounds include triphenylsulfonium tetrafluoroborate, dimethylphenylsulfonium hexafluorophosphate, tritolylsulfonium hexafluorophosphate, 4-butoxyphenyldiphenylsulfonium tetrafluoroborate, tris(4-phenoxyphenyl)**sulfonium** hexafluorophosphate, 4-acetoxy-phenyldiphenylsulfonium tetrafluoroborate, tris(4-thiomethoxyphenyl)**sulfonium** hexafluorophosphate, di(methoxynaphthyl)methylsulfonium tetrafluoroborate, dimethylnaphthylsulfonium hexafluorophosphate and phenylmethylbenzylsulfonium hexafluorophosphate.

DETDESC:

DETD(16)

of the aromatic **sulfonium** complex salts which are suitable for use in the compositions of the invention, triaryl substituted salts such as triphenylsulfonium hexafluorophosphate. . . *are preferred*

DETDESC:

DETD(17)

Another class of photoactive compounds suitable for purposes of the present invention are the **photoacid** generators such as those disclosed in U.S. Pat. No. 5,034,304. In particular, halogenated **photoacid** generators are preferred. These materials include 1,10-dibromodecane; 1,1-bis[p-chlorophenyl]-2,2-di-dichloroethane; 4,4'-dichloro-2-(trichloromethyl) benzhydrol or 1,1-bis(chlorophenyl)-2,2,2-trichloroethane (Kelthane.RTM.); hexachlorodimethyl sulfone; 2-chloro-6-(trichloromethyl) pyridine; 0,0-diethyl-0-(3,5,6-trichloro-2-pyridyl)phosphorothionate (Dursban.RTM.); . . .

DETDESC:

DETD(31)

The . . . step 1, substrate 1 is coated with soldermask coating 2. Exposure of soldermask coating 2 in step 2, using a **photoacid** generator for purposes of illustration, results in a region 3 of the coating having photogenerated acid in exposed areas as. . .

DETDESC:

DETD(50)

	30.0
Triarylsulfonium hexafluoroantimonate	4.0
Hexamethoxymethylmelamine	15.0
Filler (talc)	35.0
Additives such as dyes and photosensitizer	3.5
<b>Propylene glycol methyl ether acetate -</b>	100.0
Dipropylene glycol methyl ether acetate	
mixed solvent	

CLAIMS:

CLMS (6)

6. The method of claim 2 where said onium salt is a **sulfonium** compound.

1. EP000846681A1, Jun. 10, 1998, NOVEL **SULFONIUM** SALT COMPOUNDS, POLYMERIZATION INITIATOR, CURABLE COMPOSITION, AND CURING METHOD; TAKAHASHI, EIJI R D (JP),

INT-CL: [6] C07C381/12; [6] C08G59/68; [6] G03F7/031

2. US005756850A, May 26, 1998, **Sulfonium** salts having bridged cyclic alkyl group useful as resist for deep UV lithography; IWASA, SHIGEYUKI (JP), et al.,

INT-CL: [6] C07C331/00; [6] C07C381/00

EUR-CL: G03F7/004

3. US005747622A, May 5, 1998, Polymer having silicon atoms and **sulfonium** salt units and **photoresist** compositions containing the same; MAEDA, KATSUMI (JP), et al.,

INT-CL: [6] C08G77/06

4. US005731364A, Mar. 24, 1998, Photoimageable compositions comprising multiple arylsulfonium photoactive compounds; SINTA, ROGER F (US), et al.,

INT-CL: [6] C08F2/50; [6] G03F7/004

EUR-CL: G03F7/004; C07C381/12; C07D339/08

5. US005691111A, Nov. 25, 1997, **Photosensitive** resin composition useful as resist for deep UV lithography containing **sulfonium** salts; IWASA, SHIGEYUKI (JP), et al.,

INT-CL: [6] G03F7/004

EUR-CL: G03F7/004; G03F7/039

6. EP000751124A1, Jan. 2, 1997, **SULFONIUM** SALT COMPOUND AND POLYMERIZATION INITIATOR; TAKAHASHI, EIJI R D (JP), et al.,

INT-CL: [6] C07C381/12; [6] C08F2/46

EUR-CL: C07C381/12; C08F2/50; C08G59/68

7. WO009524387A1, Sep. 14, 1995, **SULFONIUM** SALT COMPOUND AND POLYMERIZATION INITIATOR; TAKAHASHI, EIJI (JP), et al.,

INT-CL: [6] C07C381/12; [6] C08F2/46

EUR-CL: C07C381/12; C08F2/50; C08G59/68

8. US005252436A, Oct. 12, 1993, Process for developing a positive-working **photoresist** containing poly(p-hydroxystyrene) and **sulfonium** salt with an aqueous developer containing basic organic compounds; BINDER, HORST (DE), et al.,

INT-CL: [5] G03F7/30; [5] G03F7/32

EUR-CL: G03F7/32

9. US005159088A, Oct. 27, 1992, TITLE DATA NOT AVAILABLE; SCHWALM, REINHOLD (DE),

INT-CL: C07C69/96; C07F9/68

EUR-CL: C07C381/12; C08F2/50; G03F7/029

10. US004318766A, Mar. 9, 1982, Process of using photocopolymerizable compositions based on epoxy and hydroxyl-containing organic materials; SMITH, GEORGE H,



INT-CL: G03C5/00; B32B27/38; B05D3/06; C09J5/00  
EUR-CL: G03F7/038; C08G59/62; C08G59/68

11. US004256828A , Mar. 17, 1981, Photocopolymerizable compositions based on epoxy and hydroxyl-containing organic materials; SMITH, GEORGE H,

INT-CL: G03C1/68  
EUR-CL: C08G59/62; C08G59/68; G03F7/038

12. US004124394A , Nov. 7, 1978, Color diffusion transfer photographic materials with sulfone color developing agent scavengers; SERA, HIDEFUMI, et al.,

INT-CL: G03C7/00; G03C5/54; G03C1/40  
EUR-CL: G03C8/00

13. US004108747A , Aug. 22, 1978, Curable compositions and method for curing such compositions; CRIVELLO, JAMES V,

INT-CL: C08F2/50; C08F4/00  
EUR-CL: C08G85/00; C08K5/41

ABS Search 8/15/99

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(FILE 'USPAT' ENTERED AT 16:05:45 ON 15 AUG 1999)

L1 2 S CAMERON, JAMES/IN  
L2 11 S CAMERON, JAMES F/IN  
L3 1 S MORI, JAMES MICHAEL/IN  
L4 0 S MORI, JAMES/IN  
L5 0 S MORI, JAMES M/IN  
L6 9 S ORSULA, GEORGE W/IN  
L7 0 S XU, GUANGYU/IN  
L8 43 S YAMAMOTO, YOSHIHIRO/IN  
L9 0 S L8 AND (SULFONIUM)  
L10 0 S L1 AND SULFONIUM  
L11 1 S L2 AND SULFONIUM  
L12 3 S L6 AND SULFONIUM  
L13 3 S L6 AND SULFONIUM

FILE 'EPO' ENTERED AT 16:10:36 ON 15 AUG 1999

L14 340 S SULFONIUM  
L15 13 S L14 AND (PHOTOSENSITIVE OR PHOTORESIST#)  
L16 0 S L15 AND (PROPYLENE GLYCOL)

FILE 'JPO' ENTERED AT 16:11:54 ON 15 AUG 1999

L17 0 S SULFONIUM,  
L18 536 S SULFONIUM  
L19 10 S L8 AND (PHOTOSENSITIVE OR PHOTORESIST#)